Microphysa, Westw., was rejected because the characters laid down were drawn only from the female of one species, differing greatly from the male, while those of *Zygonotus*, Fieb., included both male and female.

The remarks about *Hydrometra* and *Gerris* appear to be well founded, the majority of authors having overlooked the fact of the priority of Latreille's generic name *Hydrometra* for the species *stagnorum*. Even Burmeister has done so; for in a note under *Limnobates*, a genus he established for this species, he says:—"Die Aenderung des Gattungsnamens wurde dadurch nöthig, dass ich den Namen *Gerris* für die von Fabricius in diese Gattung gestellten Arten beibehalten zu müssen glaubte, da er das Recht der Anziennität für sich hat." *Hydrometra*, Lat., should be the generic name for *stagnorum*, and *Gerris*, Fab., be restored to the species of *Hydrometra* of authors.

In these remarks we have been careful not to travel beyond the record. The argument touches only a few points on the surface of a great subject (the real signification of genera), about which no two authors are agreed. The so-called "analytic method," for instance, so much in favour, tends to the infinite multiplication of genera; so that we are in danger of realizing the taunt of Curtis "that every species would constitute a genus," or of going a step further, and, by adopting Amyot's "système mononymique," which gives to every creature a new and single name, abolish genera altogether.

XXXVII.—*On the Muscular Anatomy of the Alligator.* By the Rev. Samuel Haughton, M.D., F.R.S., Fellow of Trinity College, Dublin.

[Plate X.]

In the sixteenth volume of the 'Annals of Natural History' (3rd series, p. 326) I published an account of the muscular anatomy of the leg of the Egyptian Crocodile (1865). Since that time I have had an opportunity of studying the anatomy of the Alligator of the Mississippi (June 1866). The specimen dissected by me was a female, upwards of 6½ feet in length. Its examination confirms, in most respects, the conclusions at which I arrived from the dissection of the smaller specimen of Crocodile previously described; and I believe the results of my dissection are worthy of being recorded.

Mr. Hair, of Edinburgh, has kindly forwarded me a copy of a paper on the Alligator, read by him as a thesis in the University, which I have compared with my own results. I feel indebted to him for having corrected an error in my former paper on the Crocodile, in which I confounded the glutæus minimus with the tensor femoris vaginæ muscle: this error has been avoided in the present paper; but I have adhered steadily to the other supposed errors pointed out by Mr. Hair, as he has failed to satisfy me that I am mistaken in my view of the true relations and names of the pelvic bones of the Alligator or Crocodile.

In Pl. X. fig. 1 is represented the pelvic arch of the Alligator (left side), in which the parts, as named by me, are—

Ischium	*Isch.*
Ilium	*Il.*
Marsupiale	*m.*
Pubes	*p.*

These bones are named by other anatomists as follows:—

Isch. + *Il.*	ilium.
p.	ischium.
m.	pubes.

The weight of evidence is altogether in favour of the names given by me, so far at least as the muscles are concerned, as will appear to any comparative anatomist from the following description, by which it appears that the usual origins are left to all the muscles, and that no difficulty occurs with respect to any muscle, except those named by me marsupiales (Nos. 44, 45), which would be called obturators by those who take a different view of the pelvic bones. On the other hand, however, such anatomists would be required to explain why the hamstring muscles should take origin from the ilium and not from the tuber ischii, and why the pectineus should arise from the anterior border of the ischium rather than from its classical origin on the pectineal line of the pubes.

Such questions, however, relate to transcendental anatomy, with which at present we have no concern; and I hope the description here given of the muscles, with their weights, origins, and insertions, will be sufficient to enable any other anatomist to recognize them readily.

I. *Muscles of the Hind Limb.*

1. Sartorius. 0·34 oz. av. O. from the anterior spine of the ilium. I. into the fascia of the inner side of the thigh, halfway down.

2. Psoas magnus. 3·67 oz. O. from all the lumbar vertebræ. I. into the outer trochanter, and, by a strong tendon, into the skin at the outer side of the thigh.

3. Iliacus. 1·20 oz. O. from whole inner anterior surface of the ilium and of the transverse processes of the anterior sacral vertebra. I. into the inner trochanter.

4. Pectineus. 0·89 oz. O. from the central anterior portion of the pubes, between the two heads of the gracilis muscle. I. into the upper part of the back of the femur.

5. Adductor brevis. 1·34 oz. O. anterior edge of pubes, behind origin of pectineus. I. into the middle two-fourths of the linea aspera.

6. Adductor magnus. 0·88 oz. O. from the posterior edge of the pubes, its middle third. I. into the lower half of the linea aspera, with a slip inserted into the joint tendon of the gracilis and semimembranosus.

7. Obturator externus. 0·44 oz. O. frcm the posterior edge of the pubes and from the obturator membrane joining that edge with the vertebræ behind the tuber ischii. I. into the back of the top of the femur, associated closely with the pectineus and with the marsupiales.

8. Adductor longus. 0·91 oz. O. from the posterior end of the symphysis pubis. I. into the back of the top of the tibia and having a fascial union with the tendon of the semitendinosus. It forms a spindle-shaped handsome muscle.

9. Quadratus femoris. 1·75 oz. O. posterior margin and inner surface of the ischium, and surface of the transverse process of the posterior sacral vertebra. I. into back of top of femur, and into the tendon of the extensor femoris caudalis.

10. Obturator internus. None.

11. Agitator caudæ. 0·97 oz. O. from the ilio-ischiadic crest, behind the origin of the glutæus maximus. I. by a double tendon, exactly as in the Crocodile (Ann. Nat. Hist. ser. 3. vol. xvi. p. 327).

12. Glutæus maximus. 1·98 oz. O. from the central two-fourths of the ilio-ischiadic crest. I. into the fascia outside and above the knee-joint.

13. Pyriformis. None.

14. Glutæus medius. 1·14 oz. O. from the central portion of the ilio-ischiadic surface. I. by a tendon passing over the outer trochanter to be inserted into a line down the upper half of the outside of the femur.

15. Glutæus minimus. None.

16. Glutæus quartus. None.

17. Glutæus quintus. None.

18. Tensor vaginæ femoris. 0·14 oz. O. from the anterior

spine of the ilium, near the articulation of the marsupial bone. I. into the fascia of the inner side of the thigh, near its middle.

19. Biceps femoris. 1·04 oz. O. This muscle has two origins ($a=0·69$, $b=0·35$), arising from two parts of the surface of the ischium, below and behind the origin of the glutæus maximus. I. as in the Crocodile (*ibid.* p. 327), except that it is partly inserted into the head of the outer gastrocnemius as well as into the peroneus longus.

20. Bicipiti accessorius. None.

21. Semimembranosus. 1·52 oz. O. tuber ischii. I. into the top of the tibia, by a common tendon with the gracilis.

22. Semitendinosus. 1·93 oz. O. tuber ischii. I. by means of a tendon having a double insertion :—*a*, into the top of the fibula; *b*, into the outer tarsal bone (cuboid) with tendon of the gastrocnemius.

23. Gracilis. 0·89 oz. This muscle consists of two parts : —*a*, 0·24 oz. ; *b*, 0·65 oz. : *a* derives its origin from the posterior angle of the pubes ; *b* arises from the anterior prominence of the pubes, close to the acetabulum and to the articulation of the marsupial bone with the pubes.

24. Rectus femoris. 0·77 oz. The origin and course of this remarkable muscle are the same as in the Crocodile (*ibid.* p. 327) ; its tendon finally terminates by becoming one of the heads of the plantaris.

25. Vastus externus. 1·01 oz.

26. Vastus internus }
27. Crureus } . 2·76 oz.

28. Popliteus. None.

29. Gastrocnemius. 2·05 oz. Consists of two parts :—*a*, outer head, 1·29 oz. ; *b*, inner head, 0·76 oz. : *a* derives its origin, as in the Crocodile, from the tendon of the great extensor femoris caudalis (Ann. Nat. Hist. ser. 3. vol. xvi. p. 328), and is inserted by a tendon passing in a groove under the calcaneum into the outer and under surface of the outer tarsal bone (cuboid) : *b* derives its origin from the inner condyle of the femur and from the top of the tibia ; the tendon of the inner head joins that of the outer head before it passes under the calcaneum ; this tendon is also joined by that of the semitendinosus.

30. Plantaris. 0·47 oz. This muscle takes its double origin, as in the Crocodile (*ibid.* p. 328), from the tendons of the rectus femoris and agitator caudæ ; and it is inserted into the calcaneum and into the fascial sheet that passes under it, which forms the origin of the flexor brevis perforatus of the second toe.

31. Soleus. None.

32. Flexor digitorum longus. 0·80 oz. O. usual. I. into the ungual phalanges of the first, second, and third toes only.

33. Flexor hallucis longus. 0·20 oz. O. from the back of the outer condyle of the femur, from the tendon of the extensor femoris caudalis. I. into the tendon of the flexor digitorum longus.

34. Tibialis posticus. 0·72 oz. This muscle is inserted into the near ends of the first and second metatarsal bones.

35. Flexor digitorum brevis. 0·76 oz. Consists of three distinct muscles, distributed to the second, third, and fourth toes: *a*, flexor 2^{di} digiti perforatus, 0·45 oz.; *b*, flexor 3^{ii} digiti perforatus, 0·20 oz.; *c*, flexor 4^{ti} digiti perforans, 0·11 oz. The flexors *a* and *b* are perforate flexors, and are distributed to the penultimate phalanges, while flexor *c* is carried on to the ungual phalanx, and supplies the office of the flexor longus, which is wanting in the fourth toe. The flexor brevis of the second toe (*a*) takes its origin partly from the calcaneum and partly from the tendon of the plantaris.

36. Flexori longo accessorius. 0·34 oz. O. from the calcaneum and cuboid bones. I. into the back of the common tendon of the flexor digitorum longus, which is distributed to the first, second, and third toes only.

37. Tibialis anticus.
38. Extensor hallucis. } 1·22 oz.
39. Extensor digitorum longus.

O. from the tibia and fibula, and by means of a long tendon from the anterior surface of the outer condyle, inside the knee-joint.

40. Peroneus tertius. 0·15 oz. The tendon of this muscle crosses the back of the foot to be inserted into the metatarsal of the first toe.

41. Peroneus brevis. 0·17 oz. Inserted into the outer side of the outer tarsal bone (cuboid and rudimentary fifth metatarsal).

42. Peroneus longus. 0·40 oz. Takes its origin from the fibula, and is closely associated with the outer gastrocnemius.

43. Extensor femoris caudalis. 14·55 oz. This important muscle is similar to that found in the Crocodile (*ibid.* p. 328), and derives its origin from the under surfaces of the transverse processes, and from the sides of the inferior spinous processes (*chevron* bones or hæmal processes) of the caudal vertebræ, from the first to the fifteenth.

N.B. The first *chevron* bone begins at the junction of the second and third caudal vertebræ.

44. Marsupialis externus. 1·05 oz.

45. Marsupialis internus. 0·59 oz.

These muscles agree with those described under the same name in the Crocodile (*ibid.* p. 330); and they are called obturator muscles by those anatomists who consider the marsupial bone to be the pubes.

46. Peroneo-calcaneus. 0·22 oz. O. from the fibula, at its lower extremity. I. into the upper surface of the calcaneum.

47. Extensor brevis. 0·87 oz. These short extensors are distributed to all the toes.

48. Lumbricales. 1·13 oz.

II. *Muscles of the Fore Limb.*

a. Trapezius. 0·33 oz. O. from the cervical fascia beneath the cervical scutes. I. into the anterior edge of the acromion, (Pl. X. fig. 2, *acr.*).

b. Sterno-atlanticus. 1·46 oz. O. from the whole breadth of the sternum, in front of its articulation with the coracoid. I. into the transverse process of the second cervical vertebra.

c. Sterno-mastoideus. Record lost.

d. Omo-hyoideus. 0·36 oz.

e. Rhomboideus*. 0·45 oz. O. from spinous processes of last cervical and first dorsal vertebra. I. anterior and vertebral edge of scapula.

f. Serratus magnus. 4·14 oz.

Serratus anticus has its origin from the second to the eighth vertebra.

Serratus posticus from the ninth to the fourteenth vertebra (ribs).

1. Teres major. 0·18 oz. Origin and insertion as usual.

2. Latissimus dorsi. 0·95 oz. O. from the four anterior dorsal scutes.

3. Subscapularis. 0·84 oz.

4. Pectoralis minor†. 0·57 oz. O. from the outer surface of the coracoid.

5. Pectoralis major. 7·68 oz. O. from the entire length of the sternum and from the abdominal ribs, two-thirds of distance to the pelvis.

6. Pectoralis (avium)? 0·90 oz. O. from the first sternal rib. I. into the posterior edge of the coracoid.

7. Coraco-brachialis. None.

8. Subclavius. None.

9. Deltoideus. 1·63 oz. O. from the whole outer and

* Meckel describes the rhomboid as smaller than the trapeze.

† This muscle is regarded by some as a coraco-brachialis superior.

inner surfaces of the acromion, winding out from the inner surface to join the outer portion of the muscle.

10. Supraspinatus. 0·28 oz.
11. Infraspinatus*. None.
12. Teres minor. None.
13. Infraspinatus secundus. None.
14. Biceps humeri (scapularis). None.
15. Brachiæus. 0·51 oz. The brachiæus muscle consists of two distinct portions:—*a*, brachialis externus, 0·24 oz.; *b*, brachialis anticus†, 0·27 oz.: of these the portion *a* is inserted into the radius, outside the insertion of the biceps; and the portion *b* is inserted into the radius, with the tendon of the biceps.
16. Biceps humeri (coracoidalis). 0·46 oz. O. from the anterior edge of the coracoid, near the glenoid cavity. I. by a common tendon with brachialis anticus, into the radius.
17. Triceps longus‡. 1·67 oz.
18. Triceps internus. }
19. Triceps externus. } 1·35 oz.
20. Triceps accessorius. }
21. Anconæus. }
22. Pronator radii teres§. None.
23. Flexor carpi radialis‖. } 0·53 oz. Inserted into the
24. Palmaris longus. } tendon of the flexor digitorum, in the centre of the palm.
25. Flexor carpi ulnaris. 0·65 oz. Inserted into the pisiform bone.
26. Flexor digitorum sublimis. }
27. Flexor digitorum profundus. } 0·31 oz.
28. Flexor pollicis longus. }

* Meckel describes the infraspinatus as distinct from the supraspinatus. I could not separate them, either in the Crocodile or Alligator.

† Meckel regards this muscle as a second head of the biceps.

‡ The triceps muscle, although it possesses no accessory cutaneous slip arising from the latissimus dorsi, yet has four heads, viz.:—

a. Triceps longus; from the posterior edge of the scapula, close to the glenoid cavity.

b. Triceps longus secundus; from a sling tendon suspended between the posterior edges of the scapula and coracoid, allowing the subscapularis to pass between the tendons.

c. Triceps externus; as usual.

d. Triceps internus; as usual.

§ Meckel describes two supinators and two pronators in the forearm of the Crocodile: I found one only of each in the Crocodile and in the Alligator.

‖ This muscle may be the palmaris longus, or, possibly, the flexor pollicis longus: its tendon is inserted, laterally, into the broad tendon of the flexor digitorum communis in the centre of the palm of the hand; and its force is expended chiefly on the thumb, index, and middle fingers.

29. Pronator quadratus*. 0·43 oz.
30. Supinator radii longus*. 0·42 oz.
31. Extensor carpi radialis longior. 0·17 oz.
32. Extensor carpi radialis brevior. 0·16 oz.
33. Supinator radii brevis*. None.
34. Extensor digitorum longus (*qu.* ext. oss. metacarpi pollicis). 0·10 oz.
35. Extensor carpi ulnaris. 0·24 oz.

III. *Muscles of the Jaws and Head.*

Herodotus and Aristotle state that the Crocodile, alone, moves the upper jaw, while other animals move the lower jaw. This statement is borne out by the muscular anatomy of the animal, which is capable of opening its mouth by lifting the upper jaw and head while its lower jaw rests upon the mud of the bank on which it lies.

A. Aristotelis apertor oris. 1·34 oz. O. from the *upper* surface of the posterior process of the angle of the lower jaw. I. into the outer fourth of the occipital ridge.

B. Pterygoideus (clausor oris). 17·90 oz. O. from the *under* surface of the posterior process of the angle of the lower jaw. I. into the back of the pterygoid plate and all round the floor of the orbit of the eye, forward.

C. Masseter. 4·90 oz.

D. Cervico-spinal occipital (α). 3·30 oz. O. from the tips of the spinous processes of all the cervical vertebræ. I. into and below the occipital ridge.

E. Cervico-spinal occipital (β). 2·32 oz. O. from the sides of the spinous processes of all the cervical vertebræ. I. into the occiput, below the insertion of the last (α).

IV. *Comparison of the Pelvic and Scapular Muscles.*

The plane of motion in which any muscle moves a bone round the joint is defined by three points :—

O. The origin of the muscle.
I. The insertion of the muscle.
C. The centre of motion of the joint.

The point I varies as the limb changes its position, while the points C and O remain absolutely fixed in the pelvis, and comparatively fixed in the shoulder or scapular joint. The lines joining (C) the centre of the joint with the points (O)

* See note §, *anteà.*

belonging to the various muscles thus mark out *fixed lines* round which the planes of muscular *momentum* must turn in every conceivable position of the joint.

If we compare together the positions of these fixed lines in the pelvic and scapular joints, we may readily obtain relations between the muscles of the hind and fore limb that would escape notice unless so examined, and which seem to possess much interest.

Let us commence with the pelvic joint (Pl. X. fig. 1), and take for the zero of our circle described round the centre of the joint the plane of the rectus femoris, tensor vaginæ femoris, and sartorius, which corresponds with the plane of flexion of the knee-joint.

Following from *right to left* (on left side of pelvis) the order of muscles, we obtain the following table:—

Pelvic Joint.

		Weight.	Azimuth.
1.	Sartorius; Rectus femoris; Tensor vaginæ femoris	1·25 oz.	0°
2.	Psoas; Iliacus	4·87 oz.	23°
3.	Marsupialis externus; Marsupialis internus	1·64 oz.	45°
4.	Gracilis; Pectineus; Adductor brevis	3·22 oz.	106°
5.	Adductor magnus; Adductor longus	1·79 oz.	125°
6.	Obturator externus	0·97 oz.	149°
7.	Quadratus femoris; Extensor femoris caudalis	16·30 oz.	194°
8.	Biceps femoris; Semitendinosus; Semimembranosus	4·49 oz.	217°
9.	Glutæus maximus; Glutæus medius; Agitator caudæ	4·09 oz.	266°
	Total..	38·62 oz. av.	

In the preceding table I have reckoned gracilis in the same azimuth with pectineus and adductor brevis, because the resultant of its two heads lies in this line.

The fixed lines of the muscles of the shoulder-joint, commencing with the triceps longus, which is in the plane of motion of the elbow-joint, from *left to right* (on left side of shoulder), may be arranged as follows:—

Shoulder-Joint.

		Weight.	Azimuth.
1.	Triceps	3·12 oz.	0°
2.	Teres major	0·18 „	2°
3.	Latissimus dorsi	0·95 „	14°
	Subscapularis	0·84 „	346°
4.	Pectoralis major	7·68 „	129°
5.	Pectoralis minor	0·57 „	190°
6.	Biceps humeri	0·46 „	258°
7.	Deltoideus	1·63 „	310°
8.	Spinati	0·28 „	342°
	Total	15·71 oz. av.	

The resultant *moment* of latissimus dorsi and subscapularis passes through a line coinciding almost exactly with the line of teres major; and these three muscles are intimately associated in their action.

If we arrange the pelvic and scapular muscles in parallel columns according to their admitted relationships, we shall obtain the following comparative table:—

Comparison of Pelvic and Scapular Muscles.

	Pelvic Muscles.			Scapular Muscles.	
1.	Rectus femoris, Sartorius	0°	1.	Triceps humeri	0°
				Teres major	2°
	Iliacus, Psoas magnus	23°		Subscapularis	−14°
				Latissimus dorsi	+14°
2.	Marsupiales	45°	2.	Wanting.	
3.	Gracilis, Pectineus, Adductor brevis	106°	3.	Pectoralis major	129°
	Adductor magnus, Adductor longus	125°			
4.	Obturator externus	149°	4.	Wanting.	
5.	Quadratus femoris, Ext. fem. caudalis	194°	5.	Pectoralis minor	190°
6.	Biceps femoris, Semitendinosus, Semimembranosus	217°	6.	Biceps humeri	258°
7.	Glutæi	266°	7.	Deltoideus	310°
				Spinati	342°

Many important deductions might be made from the preceding table; but I shall content myself with indicating the following:—

1. The analogous muscles in the hip-joint and shoulder-joint of the same side of the body are arranged in reverse order—thus confirming the opinion of Vicq d'Azyr that the left leg should be compared with the right arm, and *vice versâ*.

2. The marsupial muscles in no respect correspond with the obturators, but find their true analogues in a muscle whose direction lies between that of latissimus dorsi and the pectorals. This muscle (wanting in the Alligator and Crocodile) is found in the following animals:—the Armadillo, the Seal, the Otter, and other animals that dig or swim.

3. The analogue of the obturators is found in the second pectoral of the birds, which acts as a levator humeri, and whose line of direction lies between the pectorals. This muscle may *possibly* be represented in the Crocodile and Alligator by the pectoral muscle extended from the first sternal rib to the posterior edge of the coracoid.

XXXVIII.—*On the peculiar Structure and Function of the Spicules of* Hyalonema. By Dr. J. E. Gray, F.R.S., V.P.Z.S., F.L.S., &c.

One of the chief reasons assigned for regarding the rope-like axis of *Hyalonema* as part of a Sponge, to which some specimens have been found attached, is that it consists of spicules which are composed of silica, and formed like the spicules of sponges. Prof. Max Schultze, Prof. Wyville Thomson, and others compare them with the long filiform spicules of *Euplectella*.

Zoologists and microscopists have overlooked the importance of a very marked peculiarity in the formation of the spicules of *Hyalonema* that is not to be observed in the spicules of any kind of Sponge that I have examined or seen figured. This is the more remarkable as the peculiarity to which I refer was mentioned when I first described the genus, and is figured by Max Schultze, Brandt, and Bocage, and, indeed, by all authors who have figured the genus; but these authors have not considered why the peculiarity existed and the bearing it has on the question of the structure of the animals to which the spicules belong.

The spicules of Sponges are formed of a number of concentric layers round a central line, and they always have a perfect, more or less acute end, which is simple and formed of